

# First record of *Ammocrypta pellucida* (Agassiz, 1863) (Actinopterygii: Perciformes) from the Lake Ontario drainage basin

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**ABSTRACT:** The objective of this paper is to document the first occurrence of *Ammocrypta pellucida* in the Lake Ontario basin from samples collected in West Lake, Ontario (Canada) in 2013. Prior to this record, the known range of this imperilled species consisted of two disjunct elements in eastern North America separated by about 500 km. The new occurrence is in the middle of these two distributional elements and suggests that further inventory efforts are warranted in the intervening area.

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The Eastern Sand Darter *Ammocrypta pellucida* (Agassiz, 1863) is a small, benthic fish with translucent flesh and an elongate body, almost round in cross-section (Scott 1955). Its occurrence is strongly associated with unsilted sand substrates of streams and rivers, and sandy shoals in lakes (Scott and Crossman 1973; Daniels 1993; O'Brien and Facey 2008). The species only occurs in eastern North America, where its range has two disjunct elements separated by about 500 km. The southwestern element includes the Ohio River basin and the lower Laurentian Great Lakes drainage, and the northeastern element includes St. Lawrence River and Lac Champlain drainages (Scott and Crossman 1973; Lee *et al.* 1980; Figure 1). The Eastern Sand Darter is the only member of the genus *Ammocrypta* found in Canada. In Ontario (Canada), its distribution was formerly considered to be limited to riverine and Great Lakes habitats in the southwestern part of the province.

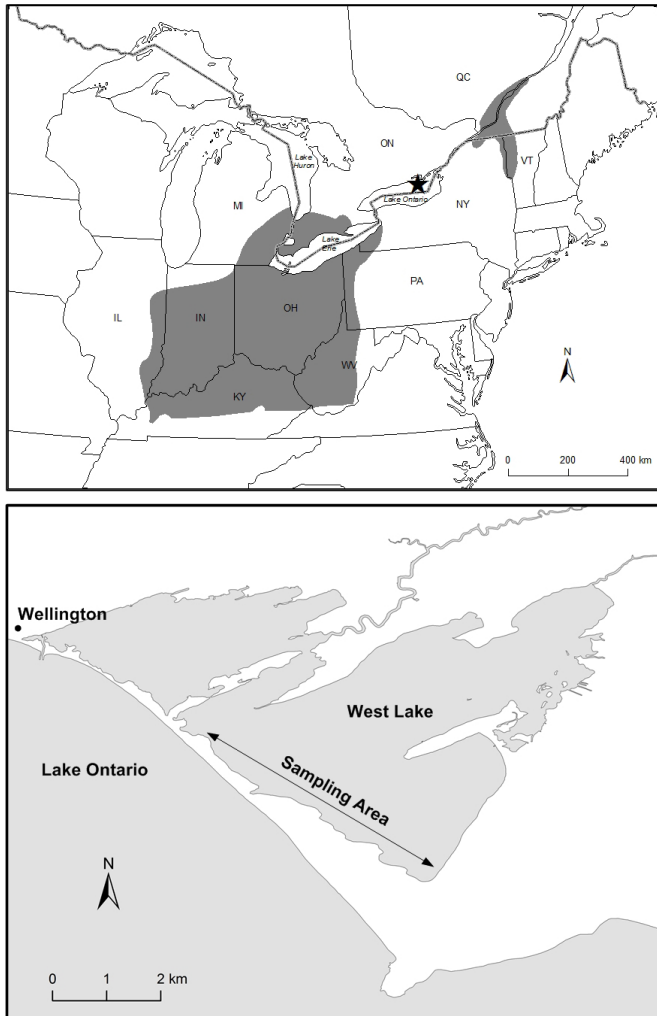
Eastern Sand Darter populations are in decline throughout its range, likely in response to habitat degradation (*e.g.*, siltation of fine sand habitats). In the province of Ontario (Canada), four of the 11 known populations are believed extirpated. Eastern Sand Darter has been assessed as Threatened in Canada (COSEWIC 2012) and globally vulnerable (G3) by the International Union for the Conservation of Nature (Gimenez Dixon 1996). The species has also been assessed as Threatened or Endangered in the provinces of Ontario and Quebec, and in the following neighbouring Great Lakes states (USA): Michigan, Pennsylvania, and New York.

The objective of this paper is to document the first occurrence of Eastern Sand Darter in the Lake Ontario basin. On 12–13 June 2013, nine individuals were collected from three sampling locations in West Lake, Ontario (43°56'11" N, 77°17'00" W) by Ontario Ministry of Natural Resources (OMNR) staff (Figure 1). Collections were made

with a bag seine (15.2 m × 2.4 m with 6.4 mm mesh and a 2.4 m × 2.4 m × 2.4 m bag with 3.2 mm mesh). The identity of a voucher specimen preserved in 10% buffered formalin was confirmed by Erling Holm, Assistant Curator of Ichthyology, Royal Ontario Museum (Toronto, Ontario) (ROM 95756).

Subsequent fall sampling (16–19 September 2013) by OMNR and Fisheries and Oceans Canada (DFO) staff yielded 866 individuals (Figure 2). Eastern Sand Darter total lengths ranged from 23 to 69 mm suggesting the presence of a relatively large and healthy population (Figure 3). Other benthic fishes captured include: Iowa Darter (*Etheostoma exile* [Girard, 1859]), Johnny Darter (*Etheostoma nigrum* Rafinesque, 1820), Logperch (*Percina caprodes* [Rafinesque, 1818]), Round Goby (*Neogobius melanostomus* [Pallas, 1814]) and Tadpole Madtom (*Noturus gyrinus* [Mitchill, 1817]). Fishes were seined from 37 sites distributed along four km of shallow (0.2–1.3 m depth), sandy habitat along the western shore. Habitats sampled are adjacent to a barrier sand dune formation in a provincially protected area that separates West Lake from Lake Ontario (Figure 2). Sites were divided in two sampling units (a 20 m long unit and a 10 m long unit) and separated by a minimum of 20 m. Two different seines were used to improve the likelihood of Eastern Sand Darter capture. Unit lengths were defined based on the minimum distance required to properly deploy each seine. The 20 m unit was sampled with five repeated hauls of a beach seine (1.8 m × 9.1 m seine with 4.8 mm wing mesh and a 1.8 m × 1.8 m × 1.8 m with 3.2 mm mesh). The 10 m unit was sampled with five repeated hauls of a bag seine (see previous description). At least five minutes elapsed between successive hauls.

Sampling was undertaken with the following permits, approvals and authorizations: DFO Species-at-Risk-Act permit 13-014, OMNR Aquatic Research and Development



**FIGURE 1.** Global range of Eastern Sand Darter (grey shaded area; modified from Page and Burr [1991]) and location of West Lake population (black star) (upper) and sampling area within West Lake (lower).

Section Animal Care Committee Approval #116, and Ontario Parks Letter of Authorization to Conduct Research in a Provincial Park (Targeted Fish Species at Risk Sampling in Sandbanks Provincial Park).

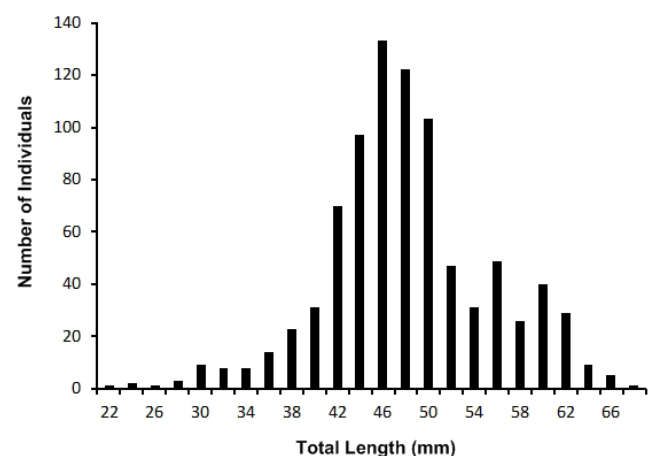
Most of the contemporary range of the Eastern Sand Darter was glaciated during the Wisconsin glaciation and these waterways were recolonized from a Mississippian glacial refugium (Hocutt and Wiley 1986). Smith (1986) stated that its absence from the Lake Ontario basin suggests that the Eastern Sand Darter may have colonized Lake Champlain (and St. Lawrence River) drainages through glacial connections in the Mohawk Valley and Glacial Lake Albany. However, Williams (1975) suggested that absence from the Lake Ontario drainage may be due to a lack of suitable habitat or recent extirpations associated with habitat alterations. Mandrak (1990) hypothesized that habitat conditions in the Lake Ontario basin may have been more suitable during the warmer climate of the Hypisthermal Period (8500–5000 YBP) with subsequent degradation. The presence of Eastern Sand Darter in West Lake demonstrates that the species accessed the Lake Ontario basin through post-glacial dispersal routes associated with Glacial Lake Iroquois.

The discovery of Eastern Sand Darter in West Lake of the Lake Ontario basin has several important conservation implications for this imperilled species. Canada's *Species*



**FIGURE 2.** Adult Eastern Sand Darter (62 mm TL) collected from West Lake, Ontario, 19 September 2013 (upper) and the barrier sand dune formation adjacent to collection sites (lower). Photographs by Alan Dextrase.

*at Risk Act* allows for the assessment and listing of geographically or genetically distinct populations. Eastern Sand Darter in Québec and Ontario were assessed and listed as two distinct populations under the Act based on the ~500 km gap between their ranges. It is not clear whether the fish in West Lake (which is in the middle of this 500 km gap) should be considered as part of one of these two populations or if the concept of geographic distinction now needs to be revisited. A recent study of range-wide genetics found distinctions between populations in Lake Champlain/St. Lawrence River drainages and the rest of the species' range (Ginson 2012). The genetic affinities of



**FIGURE 3.** Length frequency distribution of Eastern Sand Darter seined from West Lake, Ontario (September, 2013).

the West Lake population are unknown, but tissue samples collected in 2013 are currently being analyzed. Finally, the discovery of Eastern Sand Darter in West Lake suggests that there may be additional undiscovered populations in the drainages of Lake Ontario and Upper St. Lawrence River in Ontario and New York. Targeted inventory efforts are warranted in areas of suitable habitat within this region where past sampling for small benthic fishes has been limited.

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